

What is claimed is:

1 1. A modular refrigeration system, comprising:
2 a refrigeration device having a space configured for storage of products
3 therein;
4 a cooling system providing a coolant configured to cool the space;
5 at least one modular cooling element configured for placement at any
6 one of a plurality of locations within the space and configured to receive the coolant
7 so that a temperature distribution profile of the products within the space can be
8 customized.

1 2. The modular refrigeration system of Claim 1 wherein the refrigeration
2 device is a temperature controlled case.

1 3. The modular refrigeration system of Claim 1 wherein the coolant is a
2 liquid coolant.

1 4. The modular refrigeration system of Claim 1 wherein the coolant is a
2 direct expansion refrigerant.

1 5. The modular refrigeration system of Claim 1 wherein the refrigeration
2 device comprises a main heat exchanger and the modular cooling element is
3 configured to provide supplemental cooling at a predetermined location within the
4 space.

1 6. The modular refrigeration system of Claim 1 further comprising a piping
2 system interfacing with the cooling system and the modular cooling element and
3 configured to circulate the coolant through the modular cooling element.

1 7. The modular refrigeration system of Claim 1 wherein the modular
2 cooling element is portable and configured for interchangeable installation at one of
3 the plurality of locations within the space.

1 8. The modular refrigeration system of Claim 1 wherein the modular
2 cooling element is coupled to a shelf.

1 9. The modular refrigeration system of Claim 1 wherein the modular
2 cooling element is coupled to an end panel.

1 10. The modular refrigeration system of Claim 1 further comprising a
2 control system configured to regulate a flow of the coolant to the modular cooling
3 element.

1 11. The modular refrigeration system of Claim 1 wherein the modular
2 cooling element is positioned so that the temperature variation among the products
3 is minimized.

1 12. A system for customizing a temperature distribution profile within a
2 space of a refrigeration device, comprising:
3 a cooling system having a first heat exchanger in a substantially fixed
4 location and a coolant configured to cool the space;
5 a second heat exchanger configured for selective placement at a
6 desired location within the refrigeration device;
7 a piping system configured to interface with the cooling system and the
8 second heat exchanger to provide a supply of coolant to the second heat exchanger;
9 and
10 a control system configured to regulate a flow of coolant through the
11 second heat exchanger.

1 13. The system of Claim 12 wherein the refrigeration device is a
2 temperature controlled case for storage and display of food products.

1 14. The system of Claim 13 wherein the temperature controlled case is an
2 existing temperature controlled case and the second heat exchanger is configured
3 for placement as a retrofit application.

1 15. The system of Claim 13 wherein the temperature controlled case is a
2 new temperature controlled case and the second heat exchanger is configured for
3 placement during construction of the new temperature controlled case.

1 16. The system of Claim 12 wherein the first heat exchanger is a main heat
2 exchanger and the second heat exchanger is a modular cooling element.

1 17. The system of Claim 16 wherein the modular cooling element is
2 removably coupled to a surface within the space.

1 18. The system of Claim 16 wherein the modular cooling element is
2 configured for placement at a predetermined location within the space to provide a
3 source of supplemental cooling.

1 19. The system of Claim 18 wherein the predetermined location is a shelf
2 unit.

1 20. The system of Claim 18 wherein the predetermined location is an end
2 panel.

1 21. The system of Claim 16 wherein the piping system includes at least
2 one flow control device configured to regulate a flow of coolant to the modular
3 cooling element.

1 22. The system of Claim 16 wherein the modular cooling element is a fin-
2 coil type heat exchanger.

1 23. The system of Claim 12 wherein the piping system further comprises at
2 least one quick disconnect device configured to interconnect the piping system and
3 the second heat exchanger.

24. A temperature controlled case having a modular cooling system,
comprising:

a cooling system providing a coolant and having a main cooling
element in a substantially fixed location and configured to receive the coolant and
provide cooling to a space within the temperature controlled case;

at least one supplemental cooling element configured to interface with
the cooling system and to receive a supply of the coolant;

wherein the supplemental cooling element is configured to be
selectively mounted at any one of a plurality of locations within the space so that a
variation of a temperature range within the space can be substantially minimized.

25. The temperature controlled case of Claim 24 wherein the supplemental
cooling element is configured to mount on a shelf unit.

26. The temperature controlled case of Claim 24 wherein the supplemental
cooling element is configured to mount on a panel member.

27. The temperature controlled case of Claim 24 wherein the coolant is
one of a liquid secondary coolant and a direct expansion refrigerant.

28. The temperature controlled case of Claim 24 wherein the supplemental
cooling element is configured for interchangeable installation at a predetermined
location.

29. The temperature controlled case of Claim 24 wherein the supplemental
cooling element is configured to provide a localized source of cooling within the
space.

30. The temperature controlled case of Claim 24 wherein the supplemental
cooling element is configured as a substantially flat panel.

31. The temperature controlled case of Claim 24 wherein the supplemental
cooling element has a cooling capacity sufficient to minimize a temperature variation
within the space.

1 32. The temperature controlled case of Claim 24 wherein the supplemental
2 cooling element is reconfigurable to accommodate changes to the temperature
3 controlled case.

1 33. The temperature controlled case of Claim 24 further comprising a
2 supplemental warming element configured to receive a warmed supply of the
3 coolant.

4 34. A method of customizing a temperature distribution profile within a
5 refrigeration device having a cooling system, comprising:
6 determining a temperature distribution profile within the refrigeration
7 device provided by the cooling system;
8 identifying at least one location within the refrigeration device having a
9 temperature above a desired temperature range;
10 providing a modular cooling element configured for installation at the
11 location; and
12 interconnecting the modular cooling element with the cooling system.

1 35. The method of Claim 34 wherein the step of determining a temperature
2 distribution profile comprises experimentation.

1 36. The method of Claim 34 wherein the modular cooling element is
2 configured to provide localized cooling at the location.

1 37. The method of Claim 34 wherein the step of interconnecting the
2 modular cooling element with the cooling system comprises providing a piping
3 system having at least one connection device.

1 38. The method of Claim 37 wherein the piping system further comprises
2 at least one flow control device.

1 39. The method of Claim 34 wherein the modular cooling element is
2 configured for interchangeable installation at one or more locations.

1 40. The method of Claim 34 wherein the modular cooling element is
2 portable.

1 41. The method of Claim 34 wherein the refrigeration device is a
2 temperature controlled case.

1 42. The method of Claim 41 wherein the temperature controlled case is a
2 new construction temperature controlled case.

1 43. The method of Claim 34 wherein the step of determining a temperature
2 distribution profile comprises monitoring a temperature of a plurality of
3 predetermined products intended for storage and display within the refrigeration
4 device.